

Damage-Tolerant Integration of Dissimilar Materials Using Microcrack-Resistant Isolating Adhesive, Phase I

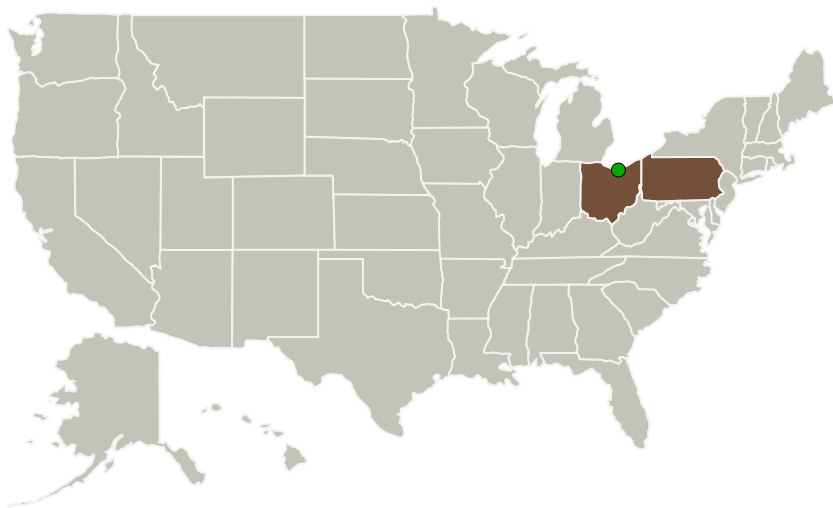
Completed Technology Project (2011 - 2011)



Project Introduction

Future space exploration projects will expose system components (such as cryogenic systems) to extreme conditions and to a higher number of pressure and temperature cycles, due to long missions and reusable launch vehicle (RLV) designs. High performance materials, such as low-density ceramics, foams, aerogels, composites, metals, and multi-layer insulations (MLI) will be increasingly used. These materials, however, often have poor mechanical strength and damage-tolerance, and are also difficult to bond to each other, due to the extreme operating temperature and pressure cycles and the mismatch between their thermal (expansion) and mechanical properties. The combination of these drawbacks resulted in the catastrophic detachment of foam insulation from the external tank (ET) in Shuttle Columbia, mission STS-107. There is a need for damage-tolerant, "forgiving" and multifunctional adhesive technologies for integrating dissimilar materials (such as cryogenic pressurized vessels to insulations), and ensuring reliable, integrated lightweight system designs. To address this need, Applied Analytic Research Inc. has designed innovative cost-effective Isolating Adhesives that are multifunctional, Bond, isolate and protect dissimilar adherends in the same time.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Applied Analytic Research	Lead Organization	Industry	West Chester, Pennsylvania
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Pennsylvania

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138072>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Applied Analytic Research

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

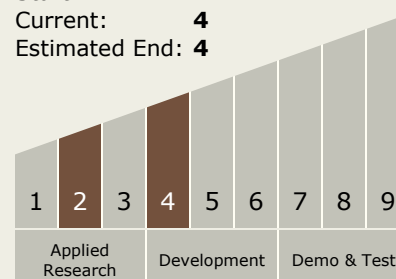
Carlos Torrez

Principal Investigator:

Rita Funchion

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.1 Manufacturing Processes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System